

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-227825

(43)Date of publication of application : 14.08.2002

(51)Int.Cl.

F16C 11/04

H05K 5/03

(21)Application number : 2001-020728

(71)Applicant : OHASHI TECHNICA INC  
HEIWA TOKEI MFG CO LTD

(22)Date of filing : 29.01.2001

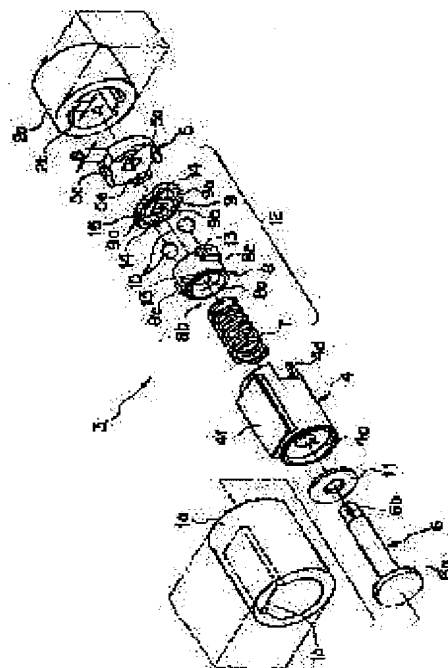
(72)Inventor : KOOTANI TAKESHI  
HAYASHI MINORU

## (54) HINGE DEVICE OF PORTABLE EQUIPMENT

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a hinge device of portable equipment capable of reducing a product cost by simplifying parts to improve workability and assembling workability increasing part accuracies, and lowering production costs.

**SOLUTION:** A connection shaft assembly 3 is passed through a fixed side tubular member 1a and a movable side tubular member 2a coaxially arranged in series to assemble the movable side tubular member 2a rotatably relative to the fixed side tubular member 1a. The holding part of a rotating engagement member is engraved in either one of the spacer 8 and the installation plate 9 of the connection shaft assembly 3, a recess allowing the rotating engagement member to disengage therefrom is engaged in the other at a specified rotating position, and a passage for the rotating engagement member is formed on the same circular position as a recess engraved position for connecting the recesses. The spacer 8 is always pressed against the installation plate 9 side by an energizing means so that a locking mechanism capable of moving the rotating engagement member in the rotating direction and allowed to be positionally fixed at a specified recess engraved position can be formed.



**\* NOTICES \***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

---

**CLAIMS**

---

[Claim(s)]

[Claim 1]Form as an assembly characterized by comprising the following, and an attaching part of said rotating-engagement-of-clutch member is engraved on either of said spacer and said tie-down plate, A passage of said rotating-engagement-of-clutch member is formed on the same circumference as a hollow engraving position which connects between each hollow while engraving a removable hollow on another side for said rotating-engagement-of-clutch member in a predetermined rotary place, A hinge device of a portable equipment having always pressed said spacer to said tie-down plate side by said energizing means, and forming in a moving direction a stopping mechanism in which position immobilization is possible in a movable and predetermined hollow engraving position for said rotating-engagement-of-clutch member.

A case member to which the opening of the end which \*\*\*\* a connecting-shaft assembly to a cylindrical member of a fixed side and a cylindrical member of a movable side which were put [ same axle ] in order by series, combines a cylindrical member of said movable side to a cylindrical member of said fixed side, enabling free rotation, and carries out inner fitting of said connecting-shaft assembly to a cylindrical member of said fixed side at rotation impossible was carried out.

Axis end covering which carries out inner fitting to a cylindrical member of said movable side at rotation impossible.

an axis position of said case member -- the same axle -- a shaft member which inserts in enabling-like and free rotation and inserts a tip part in the central part of said axis end covering at rotation impossible.

An energizing means which is attached around this shaft member and carries out inner fitting to said case member, and a spacer attached outside movable [ to shaft orientations ] free [ rotation to said shaft member ], Two or more rotating-engagement-of-clutch members infixed between a tie-down plate inserted in a tip part of said shaft member at rotation impossible while interposing between this spacer and said axis end covering, and this tie-down plate and said spacer.

[Claim 2]A hinge device of the portable equipment according to claim 1, wherein said rotating-engagement-of-clutch member is a fastball which consists of steel, ceramics, a sintered compact, etc.

[Claim 3]A hinge device of the portable equipment according to claim 1, wherein said removable hollow is formed in a longer hollow which is on the same circumference as a hollow engraving position, and was installed in a hoop direction.

[Claim 4]A hinge device of the portable equipment according to claim 1 which said removable hollow is on the same circumference as a hollow engraving position per use number of said rotating-engagement-of-clutch member, and is characterized by being formed at equal intervals.

[Claim 5]A hinge device of the portable equipment according to claim 1, wherein said energizing means is formed in a coil spring and this coil spring is attached outside the periphery side of said shaft member in same axle.

[Claim 6]A hinge device of the portable equipment according to claim 1 infixing a file plate between a head of said shaft member, and said case member.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the hinge device of the portable equipment applied to folding parts, such as a laptop PC or a book type personal computer, and a folded-up type cellular phone.

[0002]

[Description of the Prior Art]The portable equipment which has folding parts, such as a laptop type or a notebook type personal computer, and a folded-up type cellular phone, conventionally, Especially in the portable equipment which needs a very small hinge device like a cellular phone, while opening and using the cover part of the equipment body, in order to prevent a cover part from closing suddenly, various

structural devices have accomplished. For example, a prevention method of unusual closing by a means for locking using \*\* locking claw, a magnet, etc. \*\* a fixed disk and a movable disc -- compare -- there are a prevention method etc. of unusual closing by providing the uneven part which \*\*\*\* in the end face, and \*\*\*\*(ing) within the limits of a predetermined angle.

[0003][Description of the Prior Art]in such a Prior art, there was a difficulty in points of the restrictions on \*\* design and mounting, a high cost, operativity, etc., or it originated in \*\* shape complexity, the increase in a working manhour and the number of assemblers was caused, and there was a problem that a manufacturing cost increased.

[0004]

[Problem(s) to be Solved by the Invention]The technical technical problem concretely set up in order that this invention might be accomplished in view of said problem in a Prior art and might solve this, It is in simplifying each part article, improving processability and assembly nature, reducing a manufacturing cost, while raising part precision, and providing the hinge device of the portable equipment which makes product cost cheap.

[0005]

[Means for Solving the Problem]A hinge device of the portable equipment according to claim 1 in this invention as a means which can solve said technical problem effectively and which was constituted concretely, Penetrate a connecting-shaft assembly to a cylindrical member of a fixed side and a cylindrical member of a movable side which were put [ same axle ] in order by series, and a cylindrical member of said movable side is combined with them to a cylindrical member of said fixed side, enabling free rotation, A case member to which the opening of the end which carries out inner fitting of said connecting-shaft assembly at rotation impossible at a cylindrical member of said fixed side was carried out, axis end covering which carries out inner fitting to a cylindrical member of said movable side at rotation impossible, and an axis position of said case member -- the same axle -- with a shaft member which inserts in enabling-like and free rotation and inserts a tip part in the central part of said axis end covering at rotation impossible. An energizing means which is attached around this shaft member and carries out inner fitting to said case member, and a spacer attached outside movable [ to shaft orientations ] free [ rotation to said shaft member ], A tie-down plate inserted in a tip part of said shaft member at rotation impossible while interposing between this spacer and said axis end covering, Form as an assembly which consists of two or more rotating-engagement-of-clutch members

infixd between this tie-down plate and said spacer, and an attaching part of said rotating-engagement-of-clutch member is engraved on either of said spacer and said tie-down plate. A passage of said rotating-engagement-of-clutch member is formed on the same circumference as a hollow engraving position which connects between each hollow while engraving a removable hollow on another side for said rotating-engagement-of-clutch member in a predetermined rotary place. Said spacer was always pressed to said tie-down plate side by said energizing means, and a stopping mechanism in which position immobilization is possible was formed in a moving direction for said rotating-engagement-of-clutch member in a movable and predetermined hollow engraving position.

[0006]And a hinge device of a portable equipment concerning claim 2 is characterized by said rotating-engagement-of-clutch member being a fastball which consists of steel, ceramics, a sintered compact, etc.

[0007]And a hinge device of a portable equipment concerning claim 3 was formed in a longer hollow which said removable hollow is on the same circumference as a hollow engraving position, and was installed in a hoop direction again.

[0008]And said removable hollow is on the same circumference as a hollow engraving position per use number of said rotating-engagement-of-clutch member, and a hinge device of a portable equipment concerning claim 4 is formed at equal intervals again.

[0009]And said energizing means is formed in a coil spring, and a hinge device of a portable equipment concerning claim 5 is attached outside again in [ this coil spring / the periphery side of said shaft member ] same axle.

[0010]And a hinge device of a portable equipment concerning claim 6 infixd a file plate between a head of said shaft member, and said case member again.

[0011]

[Embodiment of the Invention]According to the embodiment of the following in this invention, a principal part gives graphic display explanation about the case where a rotating-engagement-of-clutch member is a fastball in the product made from a plastic. This embodiment is concretely described in order to make the main point of an invention understand better, and in particular, as long as there is no specification, it does not limit invention contents.

[0012][Elements of the Invention]A hinge device of a portable equipment in this embodiment connects relatively one end each of the parts 1 and 2 of a fixed side and a movable side rotatable, as shown in drawing 1 and 2. \*\*\*\* (inner fitting) of the connecting-shaft assembly 3 is carried out to a coaxial target, and the cylindrical member 1a of a fixed side and the cylindrical member 2a of a movable side which were

put in order in series, and the cylindrical member 2a of a movable side is combined with this terminal area to the cylindrical member 1a of a fixed side, enabling free rotation.

[0013]The case member 4 in which the connecting-shaft assembly 3 accommodates a connecting shaft in which the opening of the end which carries out inner fitting at rotation impossible was carried out to the cylindrical member 1a of a fixed side, spring parts, etc., a movable side -- a cylindrical member -- two -- a -- rotation -- impossible -- inner fitting -- carrying out -- an axis end -- a side -- covering -- five -- a case member -- four -- an axis -- a position -- the same axle ---like --- and --- rotation -- free -- inserting in -- a tip part -- covering -- five -- the central part -- rotation -- impossible -- inserting in -- doubling -- a shaft member -- six. The coil spring 7 as an energizing means which carries out inner fitting to the case member 4 while being attached outside in same axle and attaching around the periphery side of this shaft member 6, The spacer 8 attached outside movable [ to shaft orientations ] free [ rotation to the shaft member 6 ], The tie-down plate 9 attached outside a tip part of the shaft member 6 at rotation impossible while interposing between this spacer 8 and covering 5, The ball 10 as two or more rotating-engagement-of-clutch members infixed between this tie-down plate 9 and spacer 8, It forms as the file plate 11 fabricated by a cork sheet to which infix between the end face of the case member 4, and the head 6a of the shaft member 6, and frictional resistance to rotation of the shaft member 6 is made to increase, hard rubber, etc., and an assembly, \*\* and others.

[0014]The hollows 13 and 13 as an attaching part of the ball 10 drilled in one field of the confrontation sides of the spacer 8 and the tie-down plate 9 by the deep hole, The passage 15 of the ball 10 is formed on the same circumference as the hollow engraving position which connects between each hollow while the ball 10 engraves the removable hollows 14 and 14 on the field of another side in a predetermined rotary place, The spacer 8 is always pressed to the tie-down plate 9 side by the coil spring 7, and the stopping mechanism 12 in which position immobilization is possible is formed in a moving direction for the ball 10 in a movable and predetermined hollow engraving position.

[0015]And as shown in drawing 3, the hollow 14 formed in the spacer 8 or the tie-down plate 9 (the ball 10 is removable) is formed in the longer hollow which is on the same circumference as a hollow engraving position, and was installed in the hoop direction. By the central angle which two straight lines connected to the center of the ball 10 of the length of the hoop direction of the hollow 14 becoming depressed from the axis of the spacer 8 or the tie-down plate 9, and being located in the both ends of

14 make It forms so that it may become an angle about 10 – 15 \*\*. This hollow 14 is on the same circumference as a hollow engraving position per use number of the ball 10, is formed at equal intervals, and forms the passage 15 of the ball 10 which consists of a shallow slot dented slightly on the same circumference as the hollow engraving position which connects between each hollow 14.

[0016]The relation of movement of the ball 10 and the running torque of a hinge device at this time, As shown in drawing 4, the time of the ball 10 escaping from the hollow 14 serves as the maximum, It falls to torque if it escapes from the hollow 14, when having passed through the passage 15 top, The period when moving to the position of the next hollow 14 with fixed torque and falling in the next hollow 14, until torque falls and becomes depressed further much more and it reaches the pars basilaris ossis occipitalis of 14 becomes the minimum value, It moves with fixed torque in the passage 15 top until it goes up and becomes depressed to torque when moving the pars basilaris ossis occipitalis of the hollow 14 and reaches the other end of 14, and when escaping from the hollow 14 again, it becomes maximum torque from the other end.

[0017]Appearance is formed in approximately closed-end cylindrical shape as the case member 4 is shown in drawing 1 and drawing 5, and 6, The round hole 4a which becomes a bearing of the shaft member 6 is formed in the center section of the end face used as a pars basilaris ossis occipitalis, The receiving space 4b of the coil spring 7 is formed in the opening side from the formation position of this round hole 4a, Form the fitting part 4c by which inner fitting of the sliding of shaft orientations of the end part of the spacer 8 is made free to the tip part of the formation position of this receiving space 4b, and further at the end by the side of fitting part 4c formation. The lobe 8c as a baffle member of the spacer 8 forms 4 d of fitting grooves inserted in shaft orientations enabling free sliding at the time of spacer fitting, The head seat part 4e by which the head 6a and the file plate 11 of the shaft member 6 are inserted in the end of an opposite hand the spring receiving space formation side from the formation position of the round hole 4a is drilled, 4 f of baffle members of the rectangular parallelepiped shape mutually inserted in the crevice 1b formed in the cylindrical member 1a of a fixed side at the peripheral part at rotation impossible are protruded on the method of outside from a peripheral face. The product made from a plastic which consists of thermoplastics, general-purpose engineering plastics, special engineering plastics, etc. is desirable, especially POM (boria SETARU) is good, its moldability is lightweight, and since this part is high intensity, it is preferred.

[0018]In the covering 5, as shown in drawing 1 and drawing 7, a section punches the

square square hole 5a in the center section, The plate's hole 5b to which a path is expanded towards the field of an opposite hand with the opposed face of the spacer 8 is formed, The slots 5c and 5c which extend in the thickness direction mutually inserted in lobe 2b prolonged to shaft orientations while projecting towards the center from the wall of the cylindrical member 2a of a movable side furthermore, and 2b are engraved on a circumferential good interval two places at a peripheral part, 5 d of hollows of the approximate circle shape cross section which has the depth of the approximately said appearance as the thickness of the spacer 8 while inner fitting of the size for the circular shaped part of the center section of the spacer 8 is carried out to the field which counters the spacer 8 are engraved, The slots 5e and 5e on the constant width are engraved on the radial direction which inserts the lobes 9a and 9a of the tie-down plate 9 in the periphery side of 5 d of this hollow. The product made from a ferrous material is desirable, and SK (carbon tool steel) which performed especially unelectrolyzed nickel plating has high intensity and high durability, and since it is moreover cheap, this part is preferred [ SK ].

[0019]The disc-like head 6a is formed in one end of a round bar, longitudinal plane shape forms the square square-bar part 6b in the other end, and the shaft member 6 drills the small hole 6c in the apical surface of this square-bar part in same axle at slight depth, as shown in drawing 8. The product made from a ferrous material is desirable, and SK (carbon tool steel) which performed especially unelectrolyzed nickel plating has high intensity and high abrasion resistance, and since it is cheap, this part is preferred [ SK ].

[0020]As shown in drawing 9, the coil spring 7 forms an outside in the size which can be accommodated in the receiving space 4b of the case member 4, and forms it in the size which can attach an inside diameter outside the shaft member 6. The shape of the spring ends 7a and 7a is applicable whichever it forms in [ of non-grinding shape (A parts in a figure), or grinding shape (B parts in a figure) ]. Spring material wire production material is desirable, and SWPB (phosphor bronze steel wire material) which carried out especially nickel plating has high intensity and high durability with high elasticity, and since it is cheap, this part is preferred [ SWPB ].

[0021]As shown in drawing 10, the spacer 8 forms an outside in a cylindrical shape, and punches with an outside the hole 8a which the shaft member 6 penetrates to the central part in same axle, The hole 8b used as the seat which carries out inner fitting of the end of the coil spring 7 to the end surface side is drilled in same axle with an outside, The lobes 8c and 8c as a baffle member of the approximately rectangular parallelepiped shape which projects from a peripheral face to the method of the



outside of two places at a circumferential good interval at the other end face side, and is inserted in 4 d of fitting grooves of the case member 4 are protruded. Furthermore, the hollows 13 and 13 which engrave on the periphery side of the position which punched the hole 8a in the shape of an approximately hemisphere deeply slightly rather than the radius of the ball 10 per two circumferential good intervals, and hold the ball 10 enabling free rotation are formed in an other end face. The product made from a plastic is desirable like a case member, especially POM (polyacetal) is good, its moldability is lightweight, its frictional resistance with the ball 10 is small, and since this part is moreover high intensity, it is preferred.

[0022]The tie-down plate 9 protrudes on the periphery of a disc-like material the lobes 9a and 9a the shape which can be inserted in the slot 5e of the covering 5 per two places at circumferential good interval, and tabular which have a size, as shown in drawing 11. In a center section, punch the square hole 9b which carries out inner fitting of the square-bar part 6b of the shaft member 6, and the hollows 14 and 14 are engraved on a circumferential good interval per two places at the periphery side of this square hole 9b. The stomata 9c and 9c penetrated to the confrontation side with the center section of each of those hollows 14 and 14 are punched, and the passage 15 of the ball 10 which has few dents is formed on the same circumference as the hollow engraving position which connects each hollows 14 and 14. This part has a desirable product made from a ferrous material, and since it is cheap, it is preferred while SK (carbon tool steel) or SUS (stainless steel) which performed especially unelectrolyzed nickel plating has high abrasion resistance and corrosion resistance with high intensity.

[0023]the hollow 14 curved to the hoop direction as well as the passage 15 -- becoming depressed (refer to drawing 3) -- or the hollow 14 (refer to drawing 11) which has the ellipsoid surface and the same curved surface, [ form and ] It forms in the shape which falls towards a pars basilaris ossis occipitalis gradually so that the impulse force which each balls 10 and 10 become depressed and falls in 14 and 14 may be reduced, when opening the parts 2 of a movable side. When the hollow 14 of the shape of ellipsoid surface type of drawing 11 is formed especially, In order that the ball 10 may fall towards the center section gradually, while the maximum (peak) of the running torque of a hinge device becomes very low in the case of opening and closing, change of a torque curve becomes gently and smooth, A resistance force becomes strong and it comes to stop at a feel which is stopped gradually as giving a shocking click feeling is avoided and it approaches a stop position.

[0024][Assembly] Each part article which constitutes such a connecting shaft forms

the connecting-shaft assembly 3 which is assembled and connects relatively between the cylindrical member 1a of a fixed side, and the cylindrical members 2a of a movable side enabling free rotation, as shown in drawing 12 and 13. Namely, the shaft member 6 which attached the file plate 11 outside the round hole 4a of the case member 4 from the head seat part 4e side, and was brought near by the head 6a side is inserted in, Attach the coil spring 7 outside the shaft member 6, and it inserts to the innermost part of the receiving space 4b, Insert the balls 10 and 10 in each hollows 13 and 13, and they are made to hold to the spacer 8, By inserting the lobes 8c and 8c in the fitting grooves 4d and 4d of the case member 4, while turning the hole 8b side to the coil spring 7 side and inserting the hole 8a in the shaft member 6, The spacer 8 is attached in it, receiving the energizing force of the coil spring 7 in the case member 4, enabling free movement to shaft orientations, Turn so that it may become depressed on the balls 10 and 10 held at the spacer 8 and 14, 14, or the passage 15 may contact, and the square hole 9b of the tie-down plate 9 is attached outside the square-bar part 6b of the shaft member 6, As the lobes 9a and 9a of the tie-down plate 9 are furthermore inserted in the slots 5e and 5e of the covering 5, the square hole 5a of the covering 5 is attached outside the square-bar part 6b of the shaft member 6.

[0025]Then, as insert the tip formed in the small hole 6c punched at the apical surface of the square-bar part 6b of the shaft member 6 at the cone form of punch (not shown), a hammer strikes the punch head, the tip part of the square-bar part 6b is extended and the covering 5 and the tie-down plate 9 do not fall out, the connecting-shaft assembly 3 is completed. Usually, when the difference angle of the parts 2 by the side of rotation is 180 degrees. It will be in the state where the initial position of the ball 10 of the connecting-shaft assembly 3 has fallen in the hollow 14, and by rotating the parts 2 by the side of rotation, the ball 10 moves from the hollow 14 to the position of ejection and other hollows 14 at the passage 15, it falls in other hollows 14, and movement of the ball 10 stops. Thereby, strength change of the running torque produced in the case of the receipts and payments to the hollow 14 transmits to a user, and tells a click feeling effectively. When the difference angle of the parts 2 by the side of rotation is less than 180 degrees, in the position of eyelid completely closure in which the parts 2 by the side of rotation are close to the parts 1 of a fixed side, the ball 10 of the connecting-shaft assembly 3 is located in the passage 15 of the tie-down plate 9, and when the parts 2 by the side of rotation rotate to an open position, the ball 10 falls in the hollow 14. It becomes depressed with the ball initial position of this passage 15, the position of 14 opens, an angle becomes settled, and the position of the ball 10 on the passage 15 is defined with the maximum

difference angle of the parts 2 by the side of the rotation to the parts 1 of a fixed side.

[0026][Function and Effect]When the parts 2 of a movable side are opened in the embodiment constituted in this way, It rotates relatively in the direction which the cylindrical member 2a opens to the cylindrical member 1a of a fixed side, When the slots 5c and 5c which stopped to lobe 2b and 2b rotate, the covering 5 rotates, The ball 10 which the tie-down plate 9 also rotated and was held by the spacer 8 when the lobes 9a and 9a simultaneously inserted in the slots 5e and 5e rotated comes out from the hollows 14 and 14 of the tie-down plate 9, If it moves at the passage 15 and the hollows 14 and 14 of another side are arrived at, according to the size of the hollows 14 and 14, or the degree of an inclination, fall in the center section, and running torque will become small, resistance will be lost, and the center section of the hollows 14 and 14 will be arrived at, It stops moving, unless running torque is strengthened again, and rotation is stopped with a strong click feeling.

[0027]If rotation of the parts 2 of a movable side is stopped by the middle from full admission to full close at this time, while the ball 10 inserted between the spacer 8 and the tie-down plate 9 will be pressed by the passage 15 according to the energizing force of the coil spring 7, The file plate 11 attached outside by the shaft member 6 is pressed and pressed by the energizing force of the coil spring 7 between the head 6a of the shaft member 6, and the bottom of the head seat part 4e of the case member 4, It functions as a brake which stops rotation of the shaft member 6, the tie-down plate 9, and the covering 5 grade that has inserted in this tie-down plate 9, and position immobilization of the parts 2 of a movable side is carried out effectively. And again, when it is going to rotate the parts 2 of a movable side from the position, the file plate 11 enlarges early dynamic resistance, and it resists so that the parts 2 of a movable side may not operate carelessly. For this reason, the parts 2 of a movable side can be stopped in that position that there is no trouble in any way, even if it stops rotation in arbitrary positions, and it can be used, without caring about an opening.

[0028]On the contrary, when closing the parts 2 of a movable side, it rotates relatively in the direction which the cylindrical member 2a closes to the cylindrical member 1a of a fixed side, When the slots 5c and 5c which stopped to lobe 2b and 2b rotate, the covering 5 rotates, The ball 10 which the tie-down plate 9 also rotated and was held by the spacer 8 when the lobes 9a and 9a simultaneously inserted in the slots 5e and 5e rotated comes out from the hollows 14 and 14 of the tie-down plate 9, and moves towards the hollow 14 and 14 side of another side at the passage 15, It stops moving, unless running torque is strengthened again, after it falls to a center section gradually, and running torque will become small, and resistance will be lost and arriving at the

center section of the hollows 14 and 14 by the size of other hollows 14 and 14, or the degree of an inclination, if other hollows 14 and 14 are arrived at, and it stops.

[0029] Thus, by the ball's 10 becoming depressed at the time of opening and closing, moving between 14, 14, and other hollows 14 and 14, and frequenting the hollows 14 and 14 and other hollows 14 and 14, An effective click feeling can be given, and further, the click feeling in receipts and payments of the ball 10 can change with the size of the hollows 14 and 14, or the degrees of an inclination, and it can be set up give a more various and smooth click feeling. And when [, such as forming the connecting-shaft assembly 3 in the both ends of a portable equipment by having considered it as the physical relationship which becomes / which has been arranged at circumferential good interval / depressed, and makes the ball 10 frequent 14 and 14, ] using more than one, adjustment of providing symmetrically becomes easy and can improve assembly nature. By having used the ball 10 as component parts of a stopping mechanism, while being able to simplify more the shape of each part article which constitutes a stopping mechanism, a moldability can be improved, and it can manufacture easily, and cost can be reduced. By forming each part article of the connecting-shaft assembly 3 in same axle, and assembling it, a rotary part can form with sufficient accuracy, a motion becomes smoother, a using feeling becomes good, and commodity value can be raised.

[0030][Another mode] In order to make the meaning of an invention easy to understand, it is explaining concretely, but since the above embodiment and example do not limit invention contents, they may not restrict another mode which is not explained in particular, and may change it suitably. Some of another modes which meet the meaning of an invention in such a meaning are shown below.

[0031] Although the difference angle of the parts 2 by the side of rotation was 180 degrees in said embodiment, This angle may become depressed, 180 degrees of engraving positions of 14 and 14 may be opened, and it may set them up, may engrave not only this setting out but each hollows 14 and 14 on less than 180 degrees, and may form the difference angle of the parts 2 by the side of rotation as less than 180 degrees. In setting the difference angle of the parts 2 by the side of rotation as less than 180 degrees by the engraving position of these hollows 14 and 14, It is in the state where the ball 10 of the connecting-shaft assembly 3 became depressed in the initial position, and has fallen in 14, By rotating in the direction which opens the parts 2 by the side of rotation, by the ball's 10 moving from the hollow 14 to the position of ejection and other hollows 14 at the passage 15, and arriving at other hollows 14 and falling, movement of the ball 10 stops and becomes the set-up difference angle of less

than 180 degrees. The hinge device which operation of the parts 2 by the side of rotation can open, and can give a click feeling on the square of less than 180 degrees by this and which it is both opened fully, and operativity is easy, and is easy to treat is realizable.

[0032]

[Effect of the Invention]The hinge device of the portable equipment applied to claim 1 in this invention as mentioned above, While each part article which constitutes a connecting-shaft assembly can form in same axle except for a rotating-engagement-of-clutch member and being able to raise part precision, each part article can be simplified, processability and assembly nature can be improved, a manufacturing cost can be reduced, and product cost can be made cheap. And when a connecting-shaft assembly is fitted into rotation impossible to the cylindrical member of a fixed side and a movable side, respectively, The rotating-engagement-of-clutch member of a connecting-shaft assembly can rotate between a spacer and a tie-down plate, and a tie-down plate can be relatively rotated to a spacer, The cylindrical member of a fixed side and the cylindrical member of a movable side can be rotated easily, when the rotating-engagement-of-clutch member which was infixed between the spacer of a connecting-shaft assembly and the tie-down plate, and was \*\*\*\*(ed) engages and releases a hollow, a click feeling can be given and an opening and closing position can be directed clearly.

[0033]In the hinge device of the portable equipment concerning claim 2, by having made said rotating-engagement-of-clutch member into the fastball, a switching action becomes smooth, moreover, endurance can be high and reliability can be improved.

[0034]In the hinge device of the portable equipment concerning claim 3. By having formed hollow shape in the hoop direction for a long time, said rotating-engagement-of-clutch member can be formed so that the collapse to the pars basilaris ossis occipitalis of a hollow may be fallen more gradually, the shock in a switching action can be set up softly, and a using feeling can be improved.

[0035]In the hinge device of the portable equipment concerning claim 4. A switching action can be made into the same using feeling by being on the same circumference and having provided the hollow at equal intervals, Operativity can be improved, and when [, such as providing a connecting-shaft assembly in the both ends of a portable equipment further, ] using more than one, adjustment of providing symmetrically becomes easy and can improve assembly nature.

[0036]In the hinge device of the portable equipment concerning claim 5. By having

formed as a coil spring which attaches said energizing means outside said shaft member, equivalent thrust can be given to said rotating-engagement-of-clutch member pressed via said spacer, a switching action can be made smoother, and a using feeling can be improved.

[0037]In the hinge device of the portable equipment concerning claim 6. By having infixed the file plate between the head of said shaft member, and said case member, middle torque can be enlarged by resistance of a file plate to rotation of a shaft member, and even if it is the arbitrary positions which are not hollow formation positions, the cylindrical member of a movable side can be stopped effectively.

---

## DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1]It is a strabism explanatory view showing the hinge device in an embodiment of the invention.

[Drawing 2]It is a strabism explanatory view showing an example of the portable equipment in an embodiment of the invention.

[Drawing 3]It is an explanatory view showing an example of the hollow where the rotating-engagement-of-clutch member in the connecting-shaft assembly of the hinge device by an embodiment of the invention is removable, and the front view in which (A) shows arrangement of a hollow, and (B) are drawings of longitudinal section showing the sectional shape of a hollow.

[Drawing 4]It is an explanatory view showing a relation with the running torque to operation and a shaft member including the hollow of the rotating-engagement-of-clutch member in the connecting-shaft assembly of the hinge device by an embodiment of the invention.

[Drawing 5]It is an outline view for which the case member in the connecting-shaft assembly of the hinge device by an embodiment of the invention is shown, and, as for a front view and (B), a right side view and (D of a left side view and (C)) are [ (A) ] the Kamihiro side figures.

[Drawing 6]It is drawing of longitudinal section showing the case member in a connecting-shaft assembly same as the above.

[Drawing 7]It is a shape explanatory view for which covering in a connecting-shaft assembly same as the above is shown, and, as for a front view and (B), the Shimohira side figure and (D of the Kamihiro side figure and (C)) are [ (A) ] drawings of

longitudinal section.

[Drawing 8]It is a shape explanatory view showing the shaft member in a connecting-shaft assembly same as the above, and (A) is a front view and (B) is a right side view.

[Drawing 9]It is a shape explanatory view showing the coil spring in a connecting-shaft assembly same as the above, and the front view of a coil spring with which (A) has an unground end, and (B) are the front views of the coil spring which has a grinding end.

[Drawing 10]It is a shape explanatory view for which the spacer in a connecting-shaft assembly same as the above is shown, and, as for a front view and (B), a right side view and (D of a left side view and (C)) are [ (A) ] drawings of longitudinal section.

[Drawing 11]It is a shape explanatory view showing the tie-down plate in a connecting-shaft assembly same as the above, and, as for a B-B' sectional view and (B), a left side view and (C) of (A) are right side views.

[Drawing 12]It is drawing of longitudinal section showing the case where a ball is located in a passage in a connecting-shaft assembly same as the above.

[Drawing 13]It is drawing of longitudinal section showing the case where a ball is located in a hollow in a connecting-shaft assembly same as the above.

[Description of Notations]

1 The parts of a fixed side

1a Cylindrical member

1b Crevice

2 The parts of a movable side

2a Cylindrical member

2b Lobe

3 Connecting-shaft assembly

4 Case member

4a Round hole

4b Receiving space

4c Fitting part

4 d Fitting groove

4e Head seat part

4f baffle member

5 Covering

5a Square hole

5b Plate's hole

5c Slot

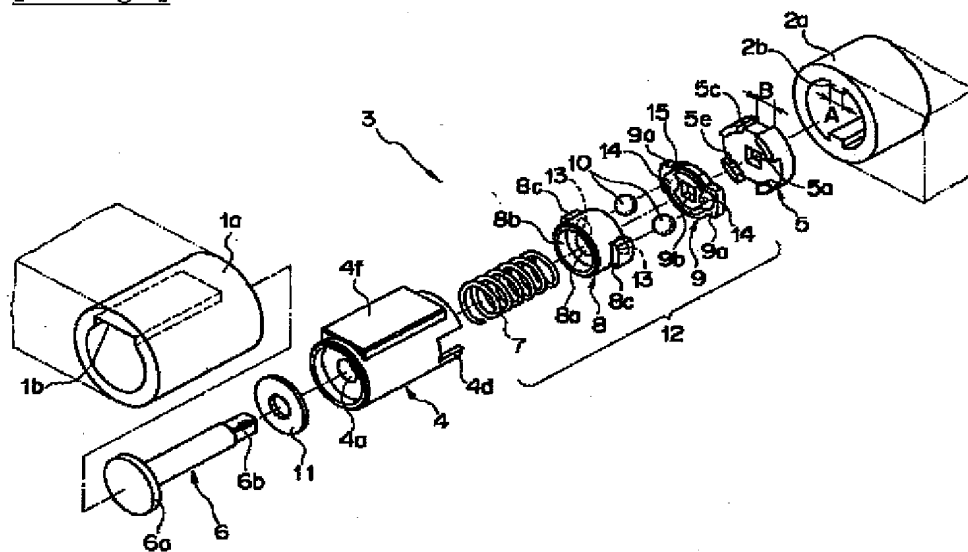
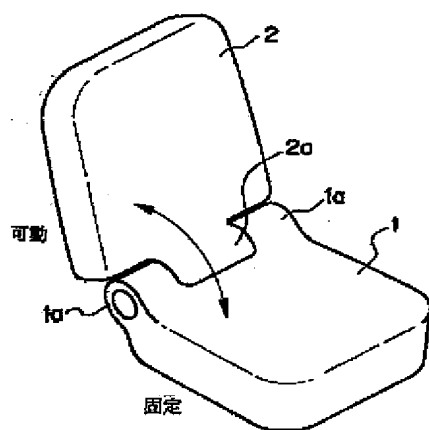
5d hollow  
5e Slot  
6 Shaft member  
6a Head  
6b Square-bar part  
6c Small hole  
7 Coil spring  
8 Spacer  
8a Hole  
8b Hole  
8c Lobe  
8d hollow  
9 Tie-down plate  
9a Lobe  
9b Square hole  
9c Stoma  
10 Ball  
11 File plate  
12 Stopping mechanism  
13 Hollow  
14 Hollow  
15 Passage



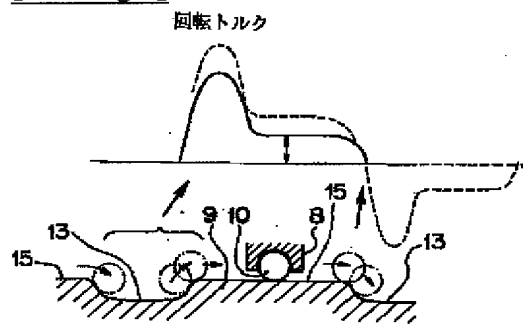
---

**DRAWINGS**

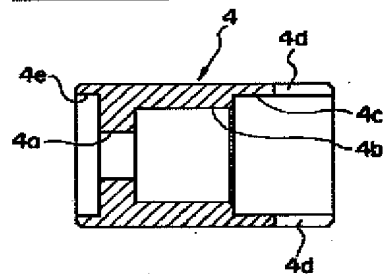
---

**[Drawing 1]****[Drawing 2]**

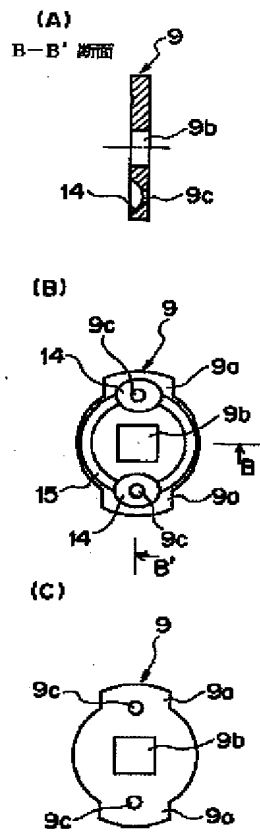
[Drawing 4]



[Drawing 6]

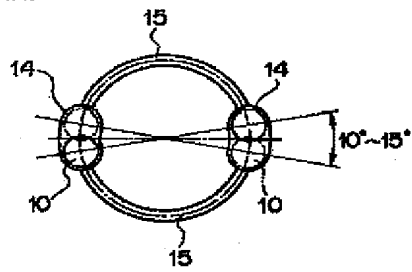


[Drawing 11]

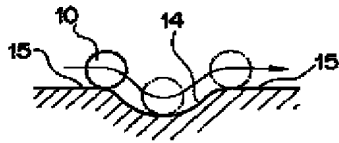


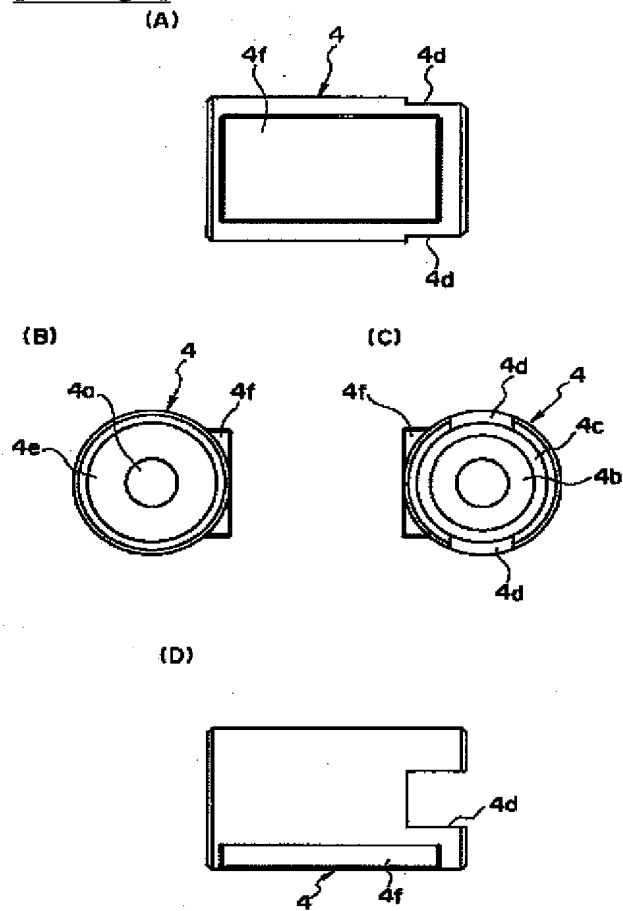
[Drawing 3]

(A)



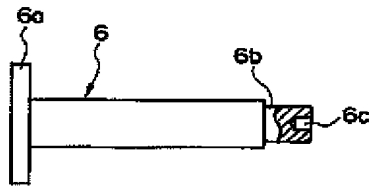
(B)



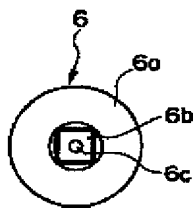
[Drawing 5]

[Drawing 8]

(A)



(B)



[Drawing 9]

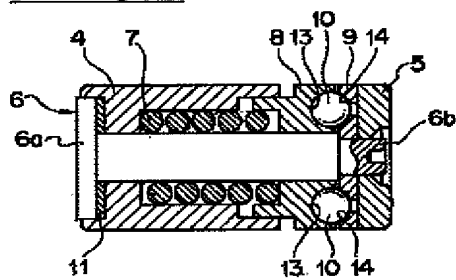
(A)

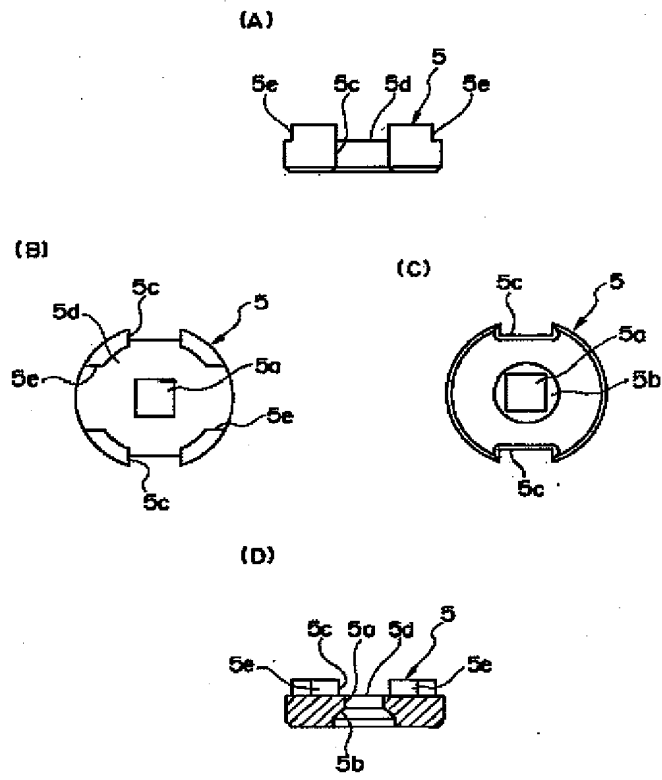


(B)

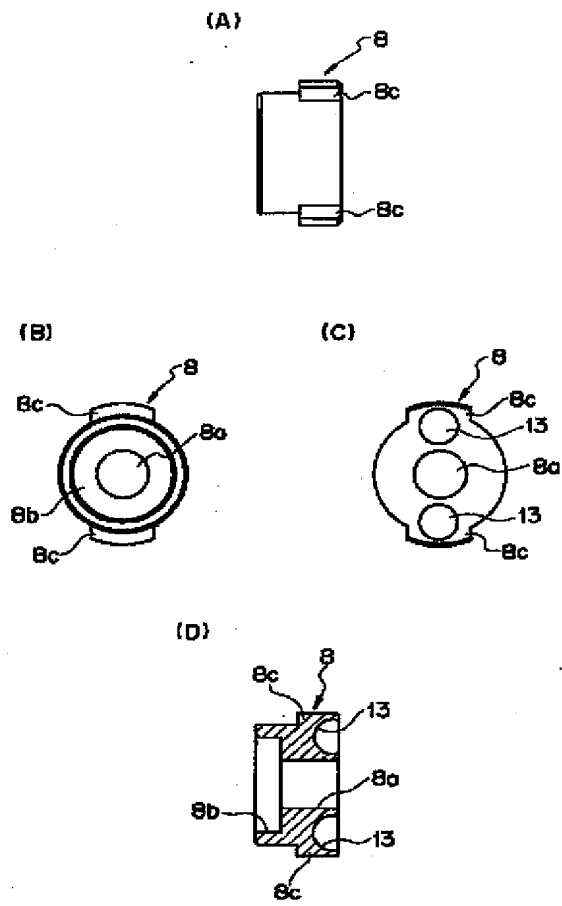


[Drawing 13]

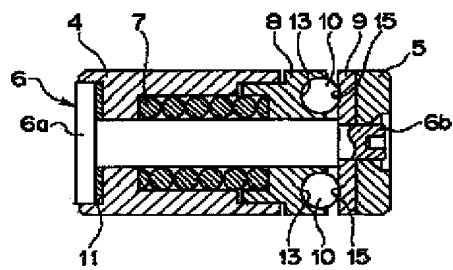


[Drawing 7]

[Drawing 10]



[Drawing 12]



[Translation done.]